Sept. 12, 1939. A. PFITZER 2,172,878

STARCH TRAY

Filed June 10, 1936 2 Sheets-Sheet 1

Fig. 1.

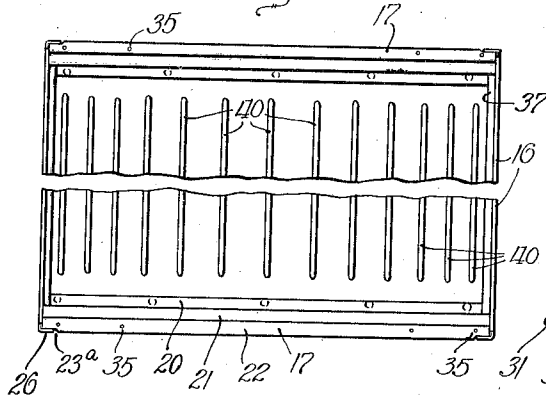


Fig. 2.

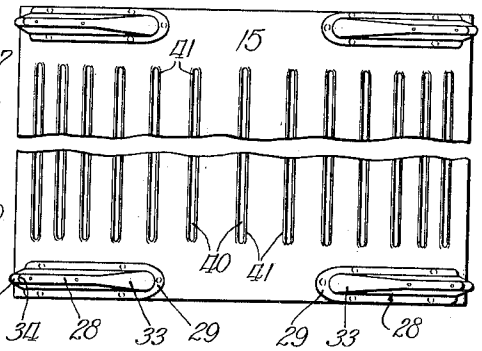


Fig. 3.

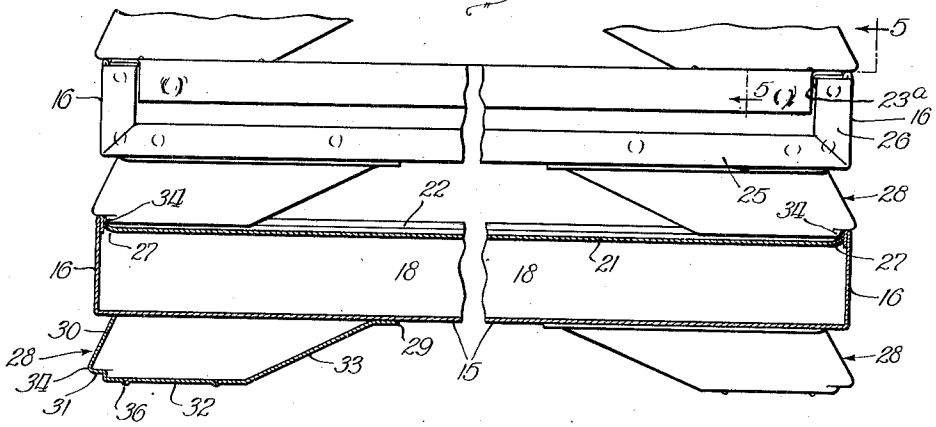


Fig. 4.

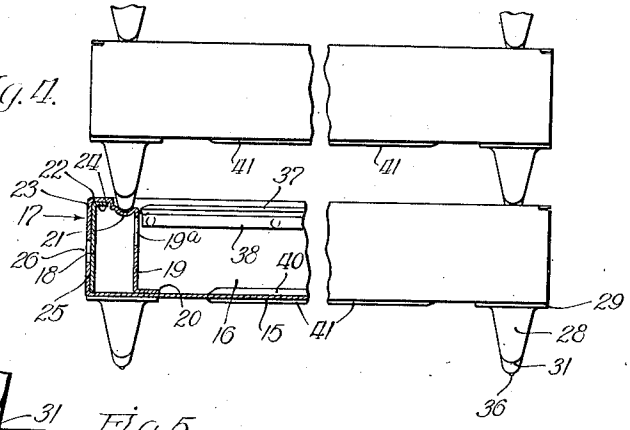
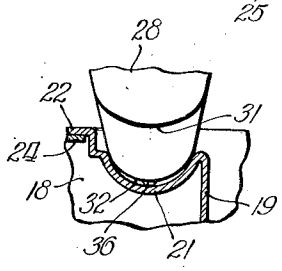


Fig. 5.



Inventor:
Adolf Pfitzer

By: Brown, Jackson, Boettcher & Dunn
Attys.

Sept. 12, 1939. A. PFITZER 2,172,878

STARCH TRAY

Filed June 10, 1936 2 Sheets-Sheet 2

Fig. 6.

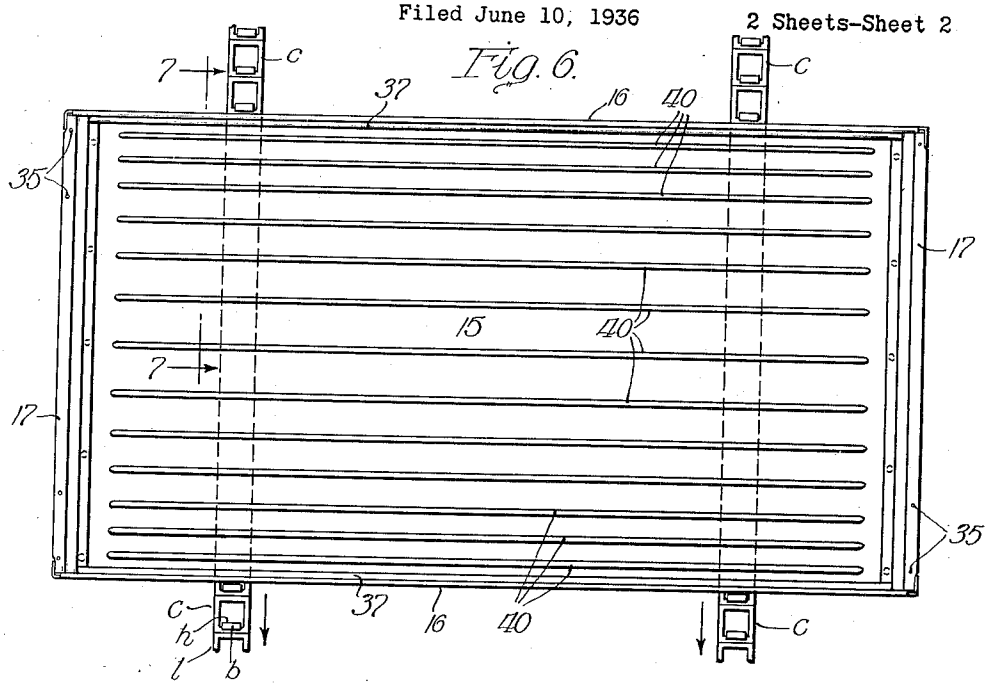


Fig. 7.

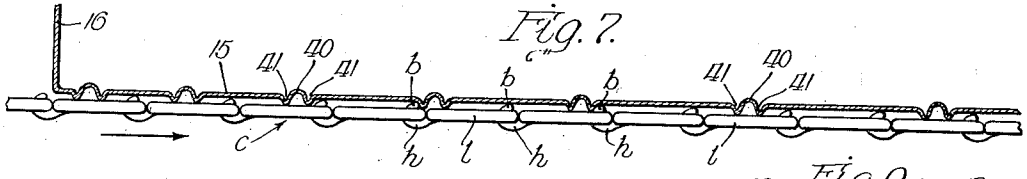


Fig. 8.

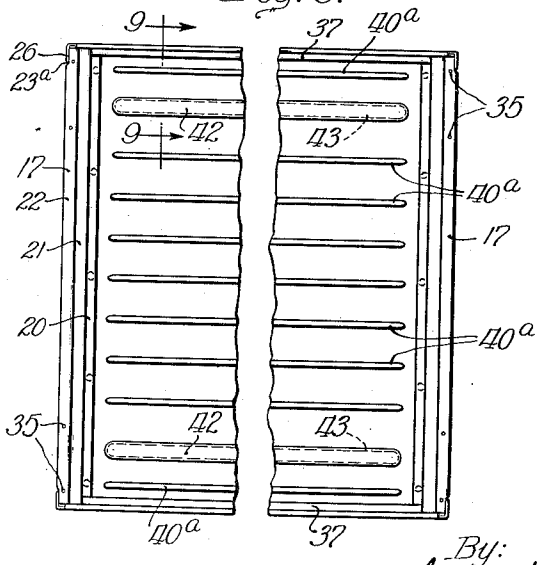
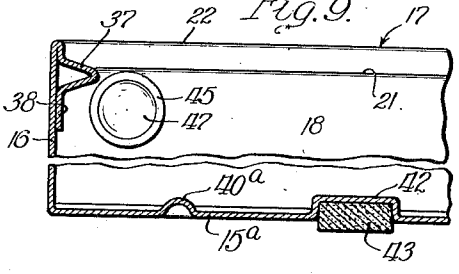


Fig. 9.



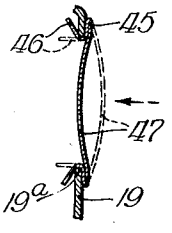


Fig. 10.

Inventor:
Adolf Pfitzer

By:
Orton, Jackson, Cottcher & Dinan
Attys.

Patented Sept. 12, 1939 2,172,878

UNITED STATES PATENT OFFICE

2,172,878

STARCH TRAY

Adolf Pfitzer, Chicago, Ill., assignor to Hugh A. Currie, Chicago, Ill., doing business as Currie Mfg. Co.

Application June 10, 1936, Serial No. 84,443

3 Claims. (Cl. 220—97)

This invention relates to trays, and has to do with trays intended for use in the manufacture of candy and for like purposes.

The instant invention is in the nature of an improvement of the tray disclosed in my Patent No. 1,994,664, issued March 19, 1935. In my aforesaid patent I have disclosed a tray intended for stacking, provided with end members having depressed inner portions forming shoulders upon which seat supporting legs of a similar superposed tray. The legs are so disposed as to fit snugly between the side walls and the outer portions of the end members of the lower tray, and are provided with notches at their lower outer corners providing shoulders which overhang the side walls of the lower tray in proximity to the upper edges of said walls. This provides means whereby the trays may be slid either lengthwise or crosswise one upon the other when stacking the trays or unstacking them. It also provides means whereby dropping of an upper tray into a lower tray, with consequent damage to the contents of the latter, is precluded.

In trays such as that disclosed in my above identified patent the legs of an upper tray fit snugly between the side walls and the outer portions of the end members of the lower tray, as above noted. They do not, however, fit tightly between the referred to elements of the lower tray since it is necessary, to permit of handling of the trays and stacking thereof, to have slight clearances, as will be obvious. In practice, the legs of the tray are so spaced lengthwise thereof that the distance between the outer end faces of the legs is approximately $\frac{1}{16}$ of an inch less than the distance between the outer portions of the end members of the tray, and the distance between the outer faces of the legs transversely of the tray and below the shoulders provided by notches therein, is $\frac{1}{16}$ of an inch less than the distance between the side walls of the tray. This provides clearances of $\frac{1}{32}$ of an inch between the legs of an upper tray and the side walls and the outer portions of the end members of a lower tray, when the trays are disposed in stacked relation and are centered accurately with respect to one another. These clearances are necessary for mechanical considerations and to permit of ready handling of the trays.

In use, the trays are filled to a proper depth with starch which is leveled off, and impressions are then made in the starch by suitable dies. The hot candy mixture is then poured into the impressions and the trays, containing the candy, are stacked, each stack containing as many as thirty trays. The weight of the candy contained in a single tray may vary largely depending upon the nature of the candy and the size of the impressions made in the starch in the tray. On an average, each tray contains approximately 5 pounds of candy, so that each stack of trays would contain 150 pounds of candy.

The trays are usually 32'' long and 14¼'' wide, outside dimensions, and 2½'' high, including the legs. After the trays have been loaded and stacked they are placed in a cooling room, commonly termed a cooling oven, where they remain until the candy has cooled and set. The cooling ovens may vary in size and are commonly of a size to receive 36 trays lengthwise and 42 trays crosswise, being approximately 7 feet high. In stacking the trays it is usual for the operator to stand at one end of the trays and slide them toward the other end of the stack being made. During the stacking operation, the operator slides the tray lengthwise until the legs thereof contact the outer portion of the remote end member of the subjacent tray. This means that each tray of the stack extends $\frac{1}{32}$ of an inch beyond the end of the next adjacent tray. In a stack of 30 trays, the top tray of the stack would extend approximately 1'' beyond the corresponding end of the bottom tray thus, in effect, increasing the length of the stack to 33''. This means that in a cooling oven having a length equal to 36 times the length of a tray, but 35 stacks of trays can be placed lengthwise, resulting in the loss of one stack of trays lengthwise of the oven. If the oven is of a width equal to 42 times the width of a tray, this means that 42 stacks of trays less can be placed in the oven than could be placed therein if the trays were accurately centered one relative to the other with their side and end walls in vertical alignment. Since stacks contain a minimum of approximately 150 pounds of candy, stacking the trays so that they overhang, as above, means approximately 6300 pounds less of candy can be placed in the cooling oven than would be possible if the trays were stacked in accurate alignment. On the other hand, if the trays are stacked from one side, as is sometimes done, with an overhang of approximately 1'', but 39 stacks of trays can be placed crosswise of a cooling oven having a width equal to that of 42 times the width of a tray. This means that, in a cooling oven of the dimensions given, 108 less trays can be placed than would be possible if the trays were stacked in such manner that the trays of each stack were accurately centered. These 108 trays would

contain a minimum of approximately 16,200 pounds of candy.

It will be clear from the above that stacking of the trays with the side and the end walls thereof in accurate alignment is of great practical importance. On the other hand, if the trays used are capable of being stacked in an overhanging manner, as above, considerable time and care would be required on the part of the operator in order to stack the trays accurately in centered relation one to the other, this extra time more than offsetting the advantages derived from accurate stacking. I find, however, that the disadvantages referred to with respect to overhanging of the stack trays, can be obviated by so constructing the trays as to assure accurate centering thereof when stacking in the usual manner, without necessity for particular care on the part of the operator.

Starch trays are commonly used in machines for manufacturing candy articles of various kinds and sizes. In practice the trays are placed upon a conveyor which moves them beneath filling means by which each tray is filled with starch. The tray is then advanced beneath a scraper which removes the excess starch and levels off the starch remaining in the tray. It is then transferred to a second conveyor and is moved thereby beneath a die or "print" which descends and impresses in the starch mold cavities of the desired size and shape.

The tray is then moved endwise, by a pusher, from the second conveyor onto a third conveyor. The latter comprises two parallel chains of known type, formed of links each provided at one end with a hook engaging about the end bar of the next adjacent link. This conveyor is operated intermittently, in a known manner, and advances the tray step by step beneath charging means of known type, which delivers molten candy to the mold cavities in the starch. The charging means ordinarily delivers the molten candy to one row of mold cavities, the tray is then advanced a step and a second row of cavities is filled to the proper extent, this operation being repeated until all of the cavities formed in the starch of the tray have been filled. It is important, particularly if the candy receiving mold cavities are small, that there be no slippage between the tray and the chains of the third conveyor, for obvious reasons.

The die or "print" exerts appreciable downward pressure on the tray bottom when impressing the mold cavities in the starch. If the tray bottom be of such character as to be deformed by this pressure, and spring upward when the pressure is released, in the upward movement of the die, the starch forming the walls of the mold cavities would be cracked and the liquid candy would leak from the cavities. This is objectionable, for obvious reasons.

Wooden trays have heretofore been used extensively in candy manufacture. Such trays do do not slip objectionably on the conveyor chains and the bottoms thereof are not objectionably springy. But wooden trays are difficult to stack accurately, are readily broken, are short lived and cannot be handled to best advantage.

My invention is directed to the provision of a starch tray so constructed as to assure that the end walls of the trays of a stack will be accurately aligned and the trays will be automatically centered relative to each other as stacked. Another object is to assure accurate aligning of both the side and end walls of the trays, during stacking thereof, whether the trays be stacked from the side or the end. A further object is to provide a metal starch tray of adequate strength and rigidity, which will not have objectionable slippage on the conveyor chains of the candy machine, and the bottom wall of which will not spring up to an objectionable extent when the mold forming die or "print" is raised. Further objects and advantages of my invention will appear from the detail description.

In the drawings:

Figure 1 is a plan view of a tray, partly broken away, embodying my invention;

Figure 2 is an underneath view of the tray of Figure 1, partly broken away;

Figure 3 is an end view, partly broken away, of a stack of trays embodying my invention, the lowermost tray being shown in section in a transverse plane adjacent the end thereof;

Figure 4 is a side view, partly in section and partly broken away, of the stack of trays shown in Figure 3;

Figure 5 is a sectional view, on an enlarged scale, taken substantially on line 5—5 of Figure 3;

Figure 6 is a plan view of the tray of Figure 1 on the chains of the conveyor for moving the tray beneath the charging means;

Figure 7 is a fragmentary sectional view, on an enlarged scale, taken substantially on line 7—7 of Figure 6;

Figure 8 is a plan view, partly broken away, of a modified form of tray embodying my invention;

Figure 9 is a fragmentary sectional view, on an enlarged scale, taken substantially on line 9—9 of Figure 8; and

Figure 10 is a detail fragmentary sectional view of the tray, on an enlarged scale, showing the means for closing the welding electrode openings in the end member of the tray.

The tray of my invention is conveniently formed of sheet metal, is of rectangular shape and of suitable depth for the purpose for which it is to be used. This tray comprises a flat bottom wall 15, side walls 16 integral with the bottom wall, and end members 17 of channel cross-section. Each of the end members comprises an end plate 18 and a member 19 of approximately Z-shape in cross-section, provided at its lower end with a flange 20 seating upon the upper face of bottom plate 15 and secured thereto in a suitable manner, conveniently by spot welding.

Member 19 is provided, adjacent its upper end, with a downwardly offset shoulder 21 of concaved cross-section, from the outer side of which extends a flange 22, from the outer edge of which extends a flange 23. Flange 22 seats upon an inwardly extending flange 24 at the upper end of plate 18, which latter seats at its lower edge upon bottom wall 15 of the tray. Flange 23 seats against the outer face of plate 18, as do flanges 25 and 26 turned upward and inward from bottom wall 15 and side walls 16, respectively, of the tray. Flange 23 is notched out at its ends, at 23a, to accommodate the upper end portions of flanges 26, and flanges 23, 25 and 26 are suitably secured, conveniently by spot welding, to plate 18. To permit of this being done with expedition and facility, member 19 is provided with suitably disposed openings 19a of a size to accommodate a suitable welding electrode.

The upper face of flange 22 is disposed in the plane of the upper edges of side walls 16 and shoulder 21 is disposed below the upper edges of the side walls, as shown. Shoulder 21 is of

arcuate cross-section, being concaved lengthwise of the tray and providing a surface inclined downward and inward of the tray from the inner edge of flange 22. The end members thus comprise inner and outer portions, the outer portion having its upper surface flush with the upper edges of the side walls of the tray, and the inner portion comprising a downwardly offset or depressed shoulder, preferably of concaved and arcuate cross-section, providing an inclined surface extending downward and inward from the outer portion of the end member. Each terminal portion of shoulder 21 is curved downward and inward of the tray transversely thereof from the adjacent side wall, as shown at 27 in Figure 3. The elements 27 provide, in effect, inclined surfaces or fillets inclined downward and inward from side walls 16.

Supporting legs 28 are secured to the tray at each corner thereof. Conveniently, these legs are formed of sheet metal and are hollow stampings. Each leg is of channel cross-section and is provided, at its top, with a peripheral flange 29 extending about the sides and the inner end of the leg. This flange seats against the under face of bottom wall 15 and is suitably secured thereto, conveniently by spot welding. The outer end of each leg 28 is closed by a wall 30 which is inclined downward and outward of the tray so as to extend slightly beyond the adjacent side wall 16. Each leg is provided, at the outer lower corner thereof, with a notch 31 extending transversely of the leg and parallel with side wall 16. The inner side of this notch is disposed substantially in the plane of the inner face of adjacent side wall 16 of the tray and the leg is disposed substantially in the plane of shoulder 21. It will thus be seen that the distance between the inner sides of the notches of the legs at each end of the tray corresponds to the interior width of the tray, and the distance between each two of the legs at each side of the tray is substantially the same as the distance between the outer portions of the end members 17 of the tray, with provision for slight clearances, previously referred to.

The bottom wall 32 of each leg 28 is of considerable length, of uniform width, and is connected to flange 29 by an inclined element 33, in the nature of a strut, effectively bracing the leg against stresses inward and transversely thereof. Bottom wall 32 of the leg 28 is of arcuate or rounded cross-section and is adapted to fit into shoulders 21, in contact with the upper surfaces thereof. The legs 28 of the tray are thus adapted to seat within the shoulders 21 of a subjacent tray in such manner that the outer end surfaces of the trays, when disposed in stacked relation, are accurately aligned in a common vertical plane.

The outer ends of legs 28, at the notches 31, are rounded at 34 and adapted to fit into the inclined elements or fillets 27 at the terminals of shoulders 21. Elements 27 and 34 thus cooperate to center the trays, when disposed in stacked relation, one relative to the other in such manner that side walls 16 of the trays are disposed in accurate alignment with their outer surfaces in a common vertical plane. This centering and aligning of the trays occurs automatically due to the cooperation between shoulders 21 and elements 27 thereof, and the bottom and outer end elements 34 of legs 28, and does not require special attention or care on the part of the operator.

If the trays are stacked lengthwise, the operator may move each tray lengthwise until the legs at the remote end thereof contact the shoulder at the inner edge of flange 22 of the subjacent tray, but the tray will move away from this shoulder, as soon as pressure thereon by the operator is released, under the influence of gravity, due to the provision of the concave shoulders 21 and the cooperating bottom surfaces of the legs 28. The trays automatically center themselves one relative to the other, and this centering action is increased with the downward pressure exerted upon a tray by the superposed trays. Also, if the trays are stacked from one side, elements 27 of shoulders 21 coact with elements 34 of feet 28 to center the trays transversely. I thus assure that the trays, when stacked, are accurately centered both lengthwise and transversely in such manner that the outer end and side surfaces of the trays are disposed in accurate alignment and in common vertical planes. This effects a saving in the space occupied by a stack of trays and permits of a materially greater number of stacks of trays being placed within a cooling oven of a given size, than would be possible if the trays were not thus accurately centered one relative to the other, when stacked, as above pointed out.

Flanges 22 of members 19 may be provided at their upper faces wtih upwardly extending rounded point elements 35 pressed therefrom, and the bottom walls 32 of legs 28 may be provided with similar elements 36 projecting downward therefrom. The elements 35 and 36 are desirable when the metal trays of my invention are stacked with wooden trays of known type, to prevent slipping between the trays, as explained in greater detail in my above identified patent. These point elements are not essential, however, and may be omitted. The elements 36 may, under certain conditions, contact the upper surfaces of shoulders 21 and assist in centering the legs 28 therein, when the tray is new and before elements 36 have become worn due to use of the tray. While elements 36 may thus facilitate centering of the trays lengthwise when new, these elements, after they become worn, due to use of the trays, do not function in this manner and the centering of the trays lengthwise will then be effected solely by the fitting of the lower portions of legs 28 into the shoulders 21. It is intended that the lower portions of the legs 28 fit into the shoulders 21 for centering the trays in the manner above described, although under certain conditions this action may be supplemented by that of the point elements 36, as above noted. In general, however, the centering of the trays lengthwise is accomplished by the cooperation between the shoulders and the legs, and the centering of the trays transversely is accomplished by the cooperation of elements 27 of the shoulders with surfaces 34 of legs 28.

Preferably, each side wall 16 of the tray is provided, at its upper portion, with an inwardly extending shoulder member 37 the upper surface of which is substantially flush with the inner edge of shoulder 21 of end members 17, shoulder 37 bridging the space between the end members. The shoulder member 37 is conveniently formed by suitably bending the metal of the upper portion of wall 16 downward and inward into proper form to form a shoulder, while providing a flange 38 extending downward from member 37, seating against the inner face of wall 16 and secured thereto by spot welding. The shoulder members 37 provide trackways

upon which the legs 28 of an upper tray may be slid during stacking or unstacking of the trays. This provides additional means for guarding against an upper tray dropping into a lower tray. The members 37 are preferably of channel cross-section and also provide means whereby the side walls of the tray are effectively reinforced and have desirable rigidity imparted to them for preventing objectionable twisting or weaving of the trays in the event they are grasped or supported from two diagonally opposite corners. The members 37, while preferred, may not be essential in all cases and may be omitted where not necessary.

In Figure 6 I have shown a tray supported upon two parallel chains *c* of a conveyor, previously referred to, intermittently operated for moving the tray beneath a charging means. Each of the chains comprises links *l* each of which is provided, at one end, with a hook *h* which engages about the end bar of the next adjacent link, bill *b* of this hook projecting upward a short distance above the links of the chain. The chains may travel in either direction but are assumed, for purposes of description, to travel in the direction indicated by the arrows in Figures 6 and 7. The distance between the chains *c* is such that these chains will pass beneath the tray, transversely thereof, within the area between the pairs of legs at the ends of the tray, and is, accordingly, somewhat less than the length of the tray.

Bottom wall 15 of the tray is provided with a plurality of lengthwise corrugations 40 and, at each side of each corrugation, with a downwardly projecting rib 41. The ribs 41 are disposed for contact by bills *b* of hooks *h* of the chains *c* for moving the tray with the conveyor. The corrugations 40 are nonuniformly spaced from each side of the tray toward the center thereof. This spacing of the corrugations is such that, in the event the bills *b* of hooks *h*, of a pair of chain links aligned transversely of the conveyor, do not contact one of the ribs 41 immediately upon placing of the tray upon the conveyor, the travel of the chains until the bills of the hooks do contact one of the ribs will be so slight as not to interfere, to an objectionable extent, with the accurate positioning of the tray beneath the charging means. This is rendered possible by the nonuniform spacing of the corrugations 40, which spacing also assures that the bills of the hooks which are not in contact with one of the ribs 41 will be disposed between the ribs of two adjacent corrugations 40 so as to assure proper engagement between the ribs 41 and the hook bills in contact therewith. This will be clear from Figure 7. The corrugations 40 and the associated ribs 41 also serve to reinforce bottom wall 15 of the tray and to impart desirable rigidity to this wall, sufficient to prevent objectionable deformation and springing up thereof when the mold cavities are formed in the starch by the die and the latter is raised.

In the modified form of tray shown in Figures 8 and 9, bottom wall 15ª is provided with corrugations 40ª, which may be uniformly spaced, and is further provided with upwardly pressed channel elements 42 extending lengthwise of wall 15ª and parallel to corrugations 40ª. Each of the channel elements 42 receives a strip 43, secured therein frictionally or in any other suitable manner and projecting a short distance below bottom wall 15ª. This strip may be formed of fabric and rubber or of any other suitable material which will grip the conveyor chains *c* frictionally to such an extent as to prevent slippage between the chains and the tray. If desired, these strips 43 may be of wood similar to that used in ordinary wood starch trays. In certain cases the channel elements 42 may render the bottom wall 15ª of the tray sufficiently rigid, in which event the corrugations 40ª may be omitted.

In order to prevent entry of starch through openings 19ª of member 19 into the end members 17, I prefer to provide means for closing such openings. Conveniently, I accomplish this by means of a closure member 45 comprising a cylindrical flange 46 and a head 47. Initially the head 47 is convexed outward and the flange 46 extends from the head substantially perpendicular thereto, as indicated in dotted lines. After flange 46 has been inserted through opening 19ª, head 47 is subjected to pressure in a suitable manner, sufficient to move this head from its dotted line position to its full line position shown in Figure 10, as indicated by the arrow in this figure, this deformation of the head serving to cause flange 46 to be distorted and bent toward member 19, thus anchoring member 45 in the opening. Closure devices of this character, and the manner of application thereof, are well known and need not be illustrated nor described in greater detail.

What I claim is:

1. As a new article of manufacture, a tray intended for stacking, said tray being of rectangular shape and comprising a bottom and side walls and relatively wide end members each having its inner portion depressed below the side walls to provide a shelf, each of said shelves being of concaved arcuate cross section lengthwise of the tray and having its side terminal elements curved downward and inward of the tray from said side walls thereof, and supporting legs secured to the ends of the tray disposed to fit between the side walls and the outer portions of the end members of a similar lower tray and seat upon said shelves, with slight clearances between said legs and said side walls and said outer portions of said end members to permit of handling and stacking of the trays, the bottom of said legs being rounded transversely and fitting into said shelves, the lower outer portions of said legs being rounded to fit into said curved terminal elements of said shelves, said legs cooperating with said shelves and said terminal elements thereof for automatically aligning the trays in the final stacking thereof.

2. As a new article of manufacture, a tray intended for stacking, said tray being of rectangular shape and comprising a bottom and side walls and relatively wide end members each having its inner portion depressed below the side walls to provide a shelf, each of said shelves being of concaved arcuate cross section lengthwise of the tray and having its side terminal elements curved downward and inward of the tray from said side walls thereof, and supporting legs secured to the ends of the tray disposed to fit between the side walls and the outer portions of the end members of a similar lower tray and seat upon said shelves, with slight clearances between said legs and said side walls and said outer portions of said end members to permit of handling and stacking of the trays, the bottom of said legs being rounded transversely and fitting into said shelves, the lower outer portions of said legs being rounded and fitting into said curved terminal elements of said shelves and notched providing stops ex-

tending outward over and in proximity to the upper edges of said side walls of a subjacent tray, said legs cooperating with said shelves and said terminal elements thereof for automatically aligning the trays in the final stacking thereof.

3. As a new article of manufacture, a tray intended for stacking, said tray being of rectangular shape and comprising a bottom and side walls and relatively wide end members each having its inner portion depressed below the side walls to provide a shelf, each of said shelves being of substantially trough shape lengthwise of the tray and defining opposed downwardly converging walls, supporting legs secured to the ends of the tray disposed to fit between the side walls and the outer portions of the end members of a similar lower tray and seat upon said shelves, with slight clearances between said legs and said side walls and said outer portions of said end members to permit of handling and stacking of the trays, said legs being shaped to fit into said shelves in cooperating contact with the opposed walls thereof effective for automatically aligning the trays lengthwise in the final stacking thereof, the lower outer portions of said legs and the side terminal portions of said shelves having cooperating elements effective for automatically aligning the trays transversely in the final stacking thereof.

ADOLF PFITZER.